

EXHIBIT A

EXHIBIT A

U.S. Patent No. 8,417,326

'326 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
<p>"heart beat interval"</p> <p>(Claims 1, 3, 12, 15)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'326 Patent, Sheets 1-7 (Figures 1-7); 1:1-2:67; 3:1-67; 4:1-67; 5:1-67; 6:1-34; 7:30-67; 8:1-31; Claims 1-15.</p> <p>'326 Patent certified file history, PLTF00000265-546, at:</p> <ul style="list-style-type: none"> • 480-485 (September 13, 2012 Office Action). • 514-521 (Amendment and Remarks to September 13, 2012 Office Action). • 525-531 (Notice of Allowance). <p>Extrinsic Evidence:</p> <p>"It is widely accepted that the heartbeat interval series during atrial fibrillation (AF) exhibits features of randomness which could be exploited in the automatic real time detection of asymptomatic AF. In this study we examine a new approach to detect randomness in RR interval time series and use it to differentiate AF from normal sinus rhythm. ... We examined</p>	<p>"time duration between heart beats"</p> <p>Intrinsic Evidence:</p> <p>PLTF00000103-16 ('326 patent), 2:20-31, 2:55-63, 3:9-19, 3:63-67, 4:1-3, 4:16-52, 4:61-67, 5:10-33, 5:54-55, 6:11-34, 7:30-37, Claims 1, 6, 7, 12, 15, Figs. 1(a)-1(f), 3(a)-3(e), 7.</p> <p>Extrinsic Evidence:</p> <p>SAM-SNY_00025199-207, at SAM-SNY_00025199 (S. Dash, <i>Automatic Real Time Detection of Atrial Fibrillation</i>, 1701.)</p> <p>SAM-SNY_00025199-207, at SAM-SNY_00025200 (S. Dash, <i>Automatic Real Time Detection of Atrial Fibrillation</i>, 1702.)</p> <p>SAM-SNY_00032449-84, at SAM-SNY_00032484 (Lu, <i>Automatic Real Time Detection of Atrial Fibrillation</i>.)</p>

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	<p>three methods based on RR intervals derived from continuous surface ECG recordings: the turning point ratio (TPR), the root mean square of successive differences (RMSSD) and Shannon Entropy (SE). ...Segments of 120 beats (~ 1.5 minutes) were used to calculate all three parameters. ... Furthermore, automatic real time detection of AF in a clinical setting appears feasible with the combined use of TPR, RMSSD and SE provided that at least 1.5 minutes of RR interval data are available.” SAM-SNY_00032449-32484, at 32484 (Lu, <i>Automatic Real Time Detection of Atrial Fibrillation</i>).</p> <p>“Time Domain Heart Rate Variability refers to numbers that can be obtained from statistical analysis of the intervals between heart beats.” PLTF00015224-15225 (<i>Time Domain Heart Rate Variability</i>, WASHINGTON UNIVERSITY SCHOOL OF MEDICINE (2024)).</p> <p>“Measurements of heartbeat interval time series have revealed that cardiac interbeat intervals fluctuate in a complex, apparently erratic manner...” PLTF00015725-15737, at 15726 (Meyer et al., <i>Dynamical Analysis of Heartbeat</i></p>	<p>SAM-SNY_00032449–84, at SAM-SNY_00032484 (Lu, <i>Automatic Real Time Detection of Atrial Fibrillation</i>.)</p> <p>PLTF00014177-82, at PLTF00014177 (Thayer, J.F., <i>Interbeat interval, A Neurovisceral Integration Model of Heart Rate Variability</i>, SCIENCE DIRECT (2017)).</p> <p>PLTF00014979-84, at PLTF00014979 (Hoang ChuDuc et al., CBET 2013: May 19-20, 2013, <i>Copenhagen, Denmark A Review of Heart Rate Variability and its Applications</i>, 7, APCBEE Procedia, 80-85 (2013)).</p>

'326 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p><i>Interval Time Series After Cardiac Transplantation</i>).</p> <p>“Heartbeat interval time series were obtained from digitized 40 min electrocardiograms (sampling rate 1200 Hz)...” PLTF00015725-15737, at 15727 (Meyer et al., <i>Dynamical Analysis of Heartbeat Interval Time Series After Cardiac Transplantation</i>).</p> <p>“To measure the heartbeat interval, the R-wave interval (RRI) obtained from an electrocardiograph (ECG) is mainly used ... Prior studies report that the pulse to pulse interval (PPI) obtained using photoplethysmography (PPG can also be used ...”. PLTF00015766-15776 (Watanabe et al., <i>Low-Noise Photoplethysmography Sensor using Correlated Double Sampling for Heartbeat Interval Acquisition</i>).</p> <p>“In determining the CDS parameters, the heartbeat intervals are extracted from data measured at a sampling rate of 250 Hz” PLTF00015766-15776, at 15772 (Watanabe et al., <i>Low-Noise Photoplethysmography Sensor using Correlated Double Sampling for Heartbeat Interval Acquisition</i>).</p>	

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	<p>PLTF00014177-14180, (Thayer, J.F., <i>Interbeat interval, A Neurovisceral Integration Model of Heart Rate Variability</i>).</p> <p>PLTF00014979-14984 (Hoang ChuDuc et al., <i>CBET 2013: May 19-20, 2013, Copenhagen, Denmark A Review of Heart Rate Variability and its Applications</i>).</p>	
<p>“Turning Points Ratio (TPR)”</p> <p>(Claims 1, 5, 9, 15)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'326 Patent, Sheets 1-3 and 7 (Figures 1-3 and 7); 1:13-37; 2:55-67; 3:5-67; 4:1-60; 6:1-67; 7:1-2, 30-47; 8:23-31; Claims 1-15.</p> <p>'326 Patent certified file history, PLTF00000265-546, at:</p> <ul style="list-style-type: none"> • 480-485 (September 13, 2012 Office Action) (“The Turning Points Ratio (TPR) is a known general statistical algorithm (Dash et al. “Automatic Real Time Detection of Atrial Fibrillation”).” • 514-521 (Amendment and Remarks to September 13, 2012 Office Action). 	<p>“a ratio of the number of intervals surrounded by either two higher (i.e., longer) or two lower (i.e., shorter) intervals to the total number of intervals”</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000103-16 ('326 patent), 2:55-63, 3:63-67, 4:16-45, Claims 1, 5, 9, 15.</p> <p>File History of '986 Continuation Application, April 5, 2016 Office Action (SAM-SNY_00001463- 590), at 3.</p> <p><u>Extrinsic Evidence:</u></p> <p>SUNY_00007407 (New Technology Disclosure Case No. R-7973).</p>

'326 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<ul style="list-style-type: none"> • 525-531 (Notice of Allowance). <p>Extrinsic Evidence:</p> <p>“The presence of randomness is ascertained by categorizing RRS relative to their surrounding RRs. It can be shown that in a vector of random numbers the fraction of numbers which are preceded and followed by both higher or lower numbers (‘Turning Points Ratio (TPR)’ is 2/3.” SUNY_00007404 (New Technology Disclosure Case No. R-7973).</p>	<p>SUNY_00007411 (New Technology Disclosure Case No. R-7973).</p> <p>SAM-SNY_00025199–207, at SAM-SNY_00025200 (S. Dash, <i>Automatic Real Time Detection of Atrial Fibrillation</i>, 1702.)</p> <p>SAM-SNY_00025199–207, at SAM-SNY_00025200 (S. Dash, <i>Automatic Real Time Detection of Atrial Fibrillation</i>, 1702.)</p> <p>SAM-SNY_00032449–84, at SAM-SNY_00032484 (Lu, <i>Automatic Real Time Detection of Atrial Fibrillation</i>.)</p> <p>SAM-SNY_00029573–76, at SAM-SNY_00029573 (Dash, <i>A Statistical Approach for Accurate Detection of Atrial Fibrillation and Flutter</i>, 137.)</p> <p>SAM-SNY_00029573–76, at SAM-SNY_00029575 (Dash, <i>A Statistical Approach for Accurate Detection of Atrial Fibrillation and Flutter</i>, 139.)</p> <p>UCONN_00004014-69, at UCONN_00004034; <i>see also</i> UCONN_00004032.</p>

'326 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
		<p>PLTF00000140-70 ('576 patent) at 4:4-16, 5:22-40, 6:30-32, claims 1, 8, and 16.</p> <p>PLTF00000238-64 ('921 patent) at 3:3-10, 5:51-6:2, 8:14-16, claims 1-9.</p> <p>PLTF00000059-80 ('601 patent) at 3:5-12, 5:56-6:10, 8:19-21, claims 1-3.</p> <p>PLTF00014083-92, at PLTF00014088 (Wesselius, Fons et al., <i>Digital biomarkers and algorithms for detection of atrial fibrillation using surface electrocardiograms: A systematic review</i>, COMPUTERS IN BIOLOGY AND MEDICINE (2021)).</p> <p>PLTF00015362-85, at PLTF00015367 (Czabanski, Robert et al., <i>Detection of Atrial Fibrillation Episodes in Long-Term Heart Rhythm Signals Using a Support Vector Machine</i>, NATIONAL LIBRARY OF MEDICINE (2020)).</p>

U.S. Patent No. 8,718,753

'753 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
<p>"intrinsic mode function[s]"</p> <p>(Claims 1, 3-8, 10, 12, 14-23, 25)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'753 Patent, Abstract; Sheets 1-6; 12 (Figures 1-6; 12); 1:27-67; 2:1-67; 3:1-43; 3:60-67; 4:1-67; 5:1-63; 6:1-45; 7:1-58; 10:58-67; 11:1-54; 13:24-29; Claims 1-26.</p> <p>'753 Patent certified file history, PLTF00005655-5986, at:</p> <ul style="list-style-type: none"> • 5933, 5945 (Written Opinion of the International Searching Authority) • 5950-5959 (Notice of Allowance) • 5960 (Examiner-Initiated Interview Summary) <p>Extrinsic Evidence:</p> <p>"it is required that the mean value of the upper and lower envelopes is zero when giving definition to IMF component in EMD" PLTF00014991-14998, at 14992 (Cheng Junsheng et al., <i>Research on the intrinsic mode function (IMF) criterion in EMD method</i>).</p> <p>"Definition 2.1: An Intrinsic Mode Function (IMF) is a function that satisfied two</p>	<p>"function[s] with equal number of extrema and zero crossings (or at most differed by one) with its envelopes, as defined by all the local maxima and minima, being symmetric with respect to zero"</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000117-139 ('753 patent), Abstract, 2:22-36, 2:59-67, 4:17-62, 5:43-49, 6:9-15, 7:8-29, 11:1-7, Figs. 2, 3A, 3B, 3C, 3D, 12, Claims 1, 3-8, 10, 12, 14-23, 25.</p> <p><u>Extrinsic Evidence:</u></p> <p>SAM-SNY_00037711-17, at SAM-SNY_00037713 (Lu et al., <i>Model-based ECG Denoising Using Empirical Mode Decomposition</i>, p. 2.)</p> <p>SAM-SNY_00081321-414, at SAM-SNY_00081334 (Huang et al., <i>The empirical mode decomposition and the Hilbert spectrum for nonlinear and non-stationary time series analysis</i>, p. 13.)</p>

'753 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p>conditions: (1) In the whole data set, the number of extrema and the number of zero crossings must either equal or differ at most by one; and (2) At any point, the mean value of the envelope defined by the local maxima and the envelope defined by the local minima is zero.” PLTF00015677-15680, at 15678 (Yang, et al., <i>A new definition of the intrinsic mode function</i>).</p> <p>“Condition 1 in Definition 2.1 can be deduced from Condition 2.” PLTF00015677-15680, at 15680 (Yang, et al., <i>A new definition of the intrinsic mode function</i>).</p> <p>“Intuitively, there are two ways to identify an intrinsic oscillatory mode: by the time lapse between the successive alternations of local maxima and minima...and by the time lapse between the successive zero crossings...in the literature...the first definition has been adopted...” PLTF00015677-15680, at 15678 (Yang, et al., <i>A new definition of the intrinsic mode function</i>).</p>	<p>SAM-SNY_00032658–65, at SAM-SNY_00032659 (Lee et al., <i>Automatic Motion and Noise Artifact Detection in Holter ECG Data using Empirical Mode Decomposition and Statistical Approaches</i>, p. 1500.)</p> <p>PLTF00014152- PLTF00014176 (Dhiman, Harsh et al., <i>Intrinsic Mode Function</i>, SCIENCE DIRECT (2022).)</p> <p>PLTF00014070-PLTF00014082 (Yu Lu, Louis, <i>Fast Intrinsic Mode Decomposition and Filtering of Times Series Data</i> (2008).)</p>

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	<p><i>Definition 3.1:</i> Let $f \in S(a, b)$, then $x_0 \in (a, b)$ is called an intrinsic maximum point of f, if it satisfies one of the two following conditions:</p> <ul style="list-style-type: none"> Existing $\delta > 0$ to make $f(x_0) > f(x) (\forall x \in (x_0 - \delta, x_0 + \delta) \setminus x_0)$ (as shown in figure 4, in which ξ is an intrinsic maximum point); Existing $\epsilon, \delta > 0$ to make: $\begin{cases} f(x) \text{ a constant during } (x_0 - \delta, x_0 + \delta); \\ f(x) \text{ a monotonic increasing function during } (x_0 - \delta - \epsilon, x_0 - \delta); \\ f(x) \text{ a monotonic decreasing function during } (x_0 + \delta, x_0 + \delta + \epsilon); \end{cases}$ <p>(such as η as shown in figure 4). Similarly, the intrinsic minimum point can be defined. The intrinsic maximum and minimum points are uniformly called the "intrinsic extreme points".</p> <p>PLTF00015677-15680, at 15679 (Yang, et al., <i>A new definition of the intrinsic mode function</i>).</p> <p>“Definition 3.4: An Intrinsic Mode Function (IMF) is a function that satisfies the condition that at any time instant, the mean value of the upper envelope as defined by the local maxima and the lower envelope as defined by the local minima is zero.” PLTF00015677-15680, at 15680 (Yang, et al., <i>A new definition of the intrinsic mode function</i>).</p> <p>“Among the urgently needed definitive work are on the definition of IMF and the stoppage criterion for EMD.” PLTF00015659-15676, at 15661 (Wang, et al. <i>On Intrinsic Mode Function</i>).</p> <p>“...the definition of IMF as given originally is this: Any function having the same numbers (or at most differing by one) of zero-crossings and extrema, and also having symmetric</p>	

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	<p>envelopes defined by local maxima and minima respectively is an Intrinsic Mode Function.” PLTF00015659-15676, at 15664 (Wang, et al. <i>On Intrinsic Mode Function</i>).</p> <p>“the definition of IMF could not be rigorously realized: for large number of siftings would produce an IMF better adhesive to the IMF definition, but such a function would not be physically meaningful.” PLTF00015659-15676, at 15666 (Wang, et al. <i>On Intrinsic Mode Function</i>).</p>	

U.S. Patent No. 9,408,576

'576 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
<p>Claim 1 Preamble: A computer implemented method for discriminating between atrial fibrillation and premature ventricular contractions (PVC) and premature atrial contractions (PACs), the method comprising:</p> <p>Claim 8 Preamble: A system for discriminating between atrial fibrillation and premature ventricular contractions (PVC) and premature atrial contractions (PACs), the system comprising:</p>	<p>This claim term, clause, or phrase is not limiting; to the extent a construction is required, plain and ordinary meaning applies.</p> <p>Intrinsic Evidence:</p> <p>'576 Patent, Sheets 1-15 (Figures 1-7); 1:1-60; 2:27-67; 3:8-39; 7:16-67; 8:1-67; 9:1-67; 10:1-67; 11:1-25, 31-58; 15:31-67; 16:1-62; 17:20-54; 19:38-41; Claims 1-20.</p> <p>'576 Patent certified file history, PLTF00000547-895, at:</p> <ul style="list-style-type: none"> 748-749 (Written Opinion of the 	<p>The preambles are limiting and require “detection of, and discrimination between, NSR (normal sinus rhythm), AF (atrial fibrillation), PVC (premature ventricular contractions), and PAC (premature atrial contractions).”</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000140-70 ('576 Patent), Abstract, 1:54-60, 2:35-57, 2:61-67, 3:11-12, 3:48-4:26, 4:27-59, 7:16-28, 7:46-52, 13:51-59, Fig. 1, Claims 1-15.</p>

'576 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p>International Searching Authority)</p> <ul style="list-style-type: none"> • 752-759 (October 6, 2015 Non-Final Office Action) • 775-796 (Amendment and Response to Non-Final Office Action) • 800-805 (Notice of Allowance) <p>Extrinsic Evidence:</p> <p>'921 Patent certified file history, PLTF00003081-3436, at:</p> <ul style="list-style-type: none"> • 3212-3220 (January 6, 2017 Non-Final Office Action): "Since the body of the fully and intrinsically sets forth all of the limitations of the claimed invention, the preamble has not been considered a limitation and is given no significant weight in the claim." (3218-3219). • 3231-3266 (Amendment and Response to Office Action) • 3268-3277 (April 14, 2017 Final Office Action) "Since the body of the fully and intrinsically sets forth all of the limitations of the claimed invention, the preamble has not been considered a limitation and is given no significant weight in the claim." (3276). 	<p>'576 patent file history, Non-Final Office Action dated October 6, 2015 (PLTF00000752-759), at 1-6.</p> <p>'576 patent file history, Amendment and Response to Office Action dated January 5, 2016 (PLTF00000775-796), at 2-3, 5-6, 9, 13-21.</p> <p>'576 patent file history, Notice of Allowance dated March 29, 2016 (PLTF00000800-805).</p>

'576 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
<p>Claim 16 Preamble: A non-transitory computer usable medium having computer readable code embodied therein, the computer readable code, when executed in one or more processors, causing the one or more processors to:</p>	<p>This claim term, clause, or phrase is not limiting; to the extent a construction is required, plain and ordinary meaning applies.</p> <p>Intrinsic Evidence:</p> <p>'576 Patent, 12:62-67; 13:1-6; 16:1-19:41; Claims 1-20.</p> <p>'576 Patent certified file history, PLTF00000547-895, at:</p> <ul style="list-style-type: none"> • 748-749 (Written Opinion of the International Searching Authority) • 752-759 (October 6, 2015 Non-Final Office Action) • 775-796 (Amendment and Response to Non-Final Office Action) • 800-805 (Notice of Allowance) <p>Extrinsic Evidence:</p> <p>'362 Patent, 5:30-35.</p> <p>Merriam Webster, https://www.merriam-webster.com/dictionary/transitory (last visited Apr. 6, 2024).</p>	<p>The preambles are limiting and require “detection of, and discrimination between, NSR (normal sinus rhythm), AF (atrial fibrillation), PVC (premature ventricular contractions), and PAC (premature atrial contractions).”</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000140-70 ('576 Patent), Abstract, 1:54-60, 2:35-57, 2:61-67, 3:11-12, 3:48-4:26, 4:27-59, 7:16-28, 7:46-52, 13:51-59, Fig. 1, Claims 1-15.</p> <p>'576 patent file history, Non-Final Office Action dated October 6, 2015 (PLTF00000752-759), at 1-6.</p> <p>'576 patent file history, Amendment and Response to Office Action dated January 5, 2016 (PLTF00000775-796), at 2-3, 5-6, 9, 13-21.</p> <p>'576 patent file history, Notice of Allowance dated March 29, 2016 (PLTF00000800-805).</p>
<p>“turning point ratio” (Claims 1, 5, 8, 12, 16, 20)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p>	<p>“a ratio of the number of intervals surrounded by either two higher (i.e., longer) or two lower (i.e., shorter) intervals to the total number of</p>

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	<p>'576 Patent, Abstract; Sheet 1 (Figure 1); 4:60-67; 5:1-6:35; 7:16-52; 9:62-12:48; 13:59-15:3; 15:31-64; Claims 1-20.</p> <p>'576 Patent certified file history, PLTF00000547-895, at:</p> <ul style="list-style-type: none"> • 748-749 (Written Opinion of the International Searching Authority) • 752-759 (October 6, 2015 Non-Final Office Action) • 775-796 (Amendment and Response to Non-Final Office Action) • 800-805 (Notice of Allowance) <p>Extrinsic Evidence: “The presence of randomness is ascertained by categorizing RRS relative to their surrounding RRs. It can be shown that in a vector of random numbers the fraction of numbers which are preceded and followed by both higher or lower numbers (‘Turning Points Ratio (TPR)’ is 2/3.” SUNY_00007404 (New Technology Disclosure Case No. R-7973).</p>	<p>intervals”</p> <p><u>Intrinsic Evidence:</u> PLTF00000140-70 ('576 patent), 4:4-16, 5:4-40, 6:28-35, Claims 1-20.</p> <p><u>Extrinsic Evidence:</u> SUNY_00007407 (New Technology Disclosure Case No. R-7973). SUNY_00007411 (New Technology Disclosure Case No. R-7973). SAM-SNY_00025199–207, at SAM-SNY_00025200 (S. Dash, <i>Automatic Real Time Detection of Atrial Fibrillation</i>, 1702.) SAM-SNY_00025199–207, at SAM-SNY_00025200 (S. Dash, <i>Automatic Real Time Detection of Atrial Fibrillation</i>, 1702.) SAM-SNY_00032449–84, at SAM-SNY_00032484 (Lu, <i>Automatic Real Time Detection of Atrial Fibrillation</i>.) SAM-SNY_00029573–76, at SAM-SNY_00029573 (Dash, <i>A Statistical</i></p>

'576 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
		<p><i>Approach for Accurate Detection of Atrial Fibrillation and Flutter</i>, 137.)</p> <p>SAM-SNY_00029573–76, at SAM-SNY_00029575 (Dash, <i>A Statistical Approach for Accurate Detection of Atrial Fibrillation and Flutter</i>, 139.)</p> <p>UCONN_00004014-69, at UCONN_00004034; <i>see also</i> UCONN_00004032.</p> <p>PLTF00000103-16 ('326 patent) at 4:16-18.</p> <p>PLTF00000238-64 ('921 patent) at 3:3-10, 5:51-6:2, 8:14-16, claims 1-9.</p> <p>PLTF00000059-80 ('601 patent) at 3:5-12, 5:56-6:10, 8:19-21, claims 1-3.</p> <p>PLTF00014083-92, at PLTF00014088 (Wesselius, Fons et al., <i>Digital biomarkers and algorithms for detection of atrial fibrillation using surface electrocardiograms: A systematic review</i>, COMPUTERS IN BIOLOGY AND MEDICINE (2021)).</p> <p>PLTF00015362-85, at PLTF00015367 (Czabanski, Robert et al., <i>Detection of Atrial Fibrillation Episodes in Long-</i></p>

'576 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
		<i>Term Heart Rhythm Signals Using a Support Vector Machine</i> , NATIONAL LIBRARY OF MEDICINE (2020)).

U.S. Patent No. 9,872,652

'652 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
<p>“the pre-processing reducing the motion artifacts in the pre-processed heart-related signal for the reconstructing” / “the pre-processing unit reducing the motion artifacts in the pre-processed heart-related signal for the reconstructing”</p> <p>(Claims 1, 25, 49)</p>	<p>This claim term, clause, or phrase is definite; to the extent a construction is required, plain and ordinary meaning applies.</p> <p>Intrinsic Evidence:</p> <p>'652 Patent, Abstract; Sheets 1-20 (Figures 1-15); 1:35-4:21; 4:54-16:47; 17:13-22:39; 25:1-31; 31:66-33:67; Claims 1-49.</p> <p>'652 Patent certified file history, PLTF00001835-3080, at:</p> <ul style="list-style-type: none"> • 2278-2281 (Written Opinion of the International Searching Authority) • 3010-3015 (May 17, 2017 Non-Final Office Action) • 3032-3047 (August 15, 2017 Amendment and Remarks) • 3051-3055 (Notice of Allowance) <p>Extrinsic Evidence:</p> <p>Declaration of Dr. Alena Talkachova.</p>	<p>Indefinite</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000196-237 ('652 patent) at 1:37-2:16, 3:7-24, 9:45-10:57, 15:38-51, 18:61-19:16, 20:12-42, 25:6-17, Figs. 1A, 2A, 2B, 3A-3C, 4, 5, 15, Claims 1-49.</p> <p>'652 patent file history, Amendment and Remarks in Response to Office Action, dated August 15, 2017 (PLTF00003032-PLTF00003047).</p> <p>'652 patent file history, Non-Final Office Action dated May 17, 2017 (PLTF00003010- PLTF00003016).</p> <p><u>Extrinsic Evidence:</u></p>

'652 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	PLTF00014190-14925, at 14788-14791, <i>Chou's Electrocardiography in Clinical Practice</i> (6th ed.), Elsevier (2008) (discussing motion artifacts).	Expert Declaration Dr. Igor Efimov at ¶¶14-24.
<p>“wherein the reconstructing further reduces the motion artifacts reduced by the pre-processing” / “wherein the reconstruction unit further reduces the motion artifacts reduced by the pre-processing unit”</p> <p>(Claims 3, 27)</p>	<p>This claim term, clause, or phrase is definite; to the extent a construction is required, plain and ordinary meaning applies.</p> <p>Intrinsic Evidence:</p> <p>'652 Patent, Abstract; Sheets 1-20 (Figures 1-15); 1:35-4:21; 4:54-6:10; 7:37-22:39; 25:1-31; 27:37-29:38; 31:66-33:67; Claims 1-49.</p> <p>'652 Patent certified file history, PLTF00001835-3080, at:</p> <ul style="list-style-type: none"> • 2278-2281 (Written Opinion of the International Searching Authority) • 3010-3015 (May 17, 2017 Non-Final Office Action) • 3032-3047 (August 15, 2017 Amendment and Remarks) • 3051-3055 (Notice of Allowance) <p>Extrinsic Evidence:</p> <p>Declaration of Dr. Alena Talkachova. <i>Chou's Electrocardiography in Clinical Practice</i> (6th ed.), Elsevier (2008), pp. 594-</p>	<p>Indefinite</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000196-237 ('652 patent) at 1:37-2:16, 3:7-24, 9:45-10:57, 15:38-51, 18:61-19:16, 20:12-42, 25:6-17, Figs. 1A, 2A, 2B, 3A-3C, 4, 5, 15, Claims 1-49.</p> <p>'652 patent file history, Amendment and Remarks in Response to Office Action, dated August 15, 2017 (PLTF00003032-PLTF00003047).</p> <p>'652 patent file history, Non-Final Office Action dated May 17, 2017 (PLTF00003010- PLTF00003016).</p> <p><u>Extrinsic Evidence:</u></p>

'652 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	597 (discussing motion artifacts).	Expert Declaration Dr. Igor Efimov at ¶¶14-16, 25-27.
<p>“a movement classification of the movement”</p> <p>(Claims 16, 40)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'652 Patent, Sheets 1-20 (Figures 1-15); 1:35-4:21; 8:35-43; 8:21-22:39; 25:1-31; 27:37-29:38; 31:66-33:67; Claims 1-49.</p> <p>'652 Patent certified file history, PLTF00001835-3080, at:</p> <ul style="list-style-type: none"> • 2278-2281 (Written Opinion of the International Searching Authority) • 3010-3015 (May 17, 2017 Non-Final Office Action) • 3032-3047 (August 15, 2017 Amendment and Remarks) • 3051-3055 (Notice of Allowance) 	<p>“a classification of movement of the biomedical sensor relative to a sensing location”</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000196-237 ('652 patent) at 1:37-60, 2:47-51, 8:44-54, 12:66-14:45, 15:24-37, 16:21-17:28, 21:7-11, Figs. 1A, 2A, 2B, 3A-3C, 4, 5, 15, Claims 1, 16, 25, 40, 49</p>
<p>“employing the reconstructed representation to detect or predict a heart-related ailment, the heart-related ailment including at least one of a heart rate variability (HRV) condition, atrial fibrillation condition, congestive heart failure condition, and tachycardia condition” / “an ailment unit configured to employ the reconstructed representation to detect or predict a heart-related ailment, the heart-related ailment including at least one of a heart</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'652 Patent, Sheets 1-20 (Figures 1-15); 1:35-4:21; 8:21-22:39; 25:1-31; 27:37-29:38; 31:66-33:67; 35:19-24; 36:62-67; Claims 1-49.</p> <p>'652 Patent certified file history, PLTF00001835-3080, at:</p>	<p>“employing the reconstructed representation to detect or predict one or more of each of the following heart-related ailments: a heart rate variability (HRV) condition, atrial fibrillation condition, congestive heart failure condition, and tachycardia condition.”</p> <p><u>Intrinsic Evidence:</u></p>

'652 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
rate variability (HRV) condition, atrial fibrillation condition, congestive heart failure condition, and tachycardia condition" (Claims 22, 46)	<ul style="list-style-type: none"> 2278-2281 (Written Opinion of the International Searching Authority) 3010-3015 (May 17, 2017 Non-Final Office Action) 3032-3047 (August 15, 2017 Amendment and Remarks) 3051-3055 (Notice of Allowance) 	PLTF00000196-237 ('652 patent) at 2:62-67, 9:30-36, 12:25-34, 21:19-30, Figs. 1A, 2A, 2B, 3A-3C, 4, 5, 15, Claims 22, 46.

U.S. Patent No. 9,986,921

'921 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
<p>Preambles - Claims 1-6</p> <p>Claim 1: A computer implemented method for discriminating between normal sinus rhythm without premature ventricular contractions (PVC) or premature atrial contractions (PAC) and atrial fibrillation and premature ventricular contractions (PVC) and premature atrial contractions (PACs), the method comprising:</p> <p>Claim 2: A computer implemented method for discriminating between atrial fibrillation and premature ventricular contractions (PVC) and premature atrial contractions (PACs) and normal sinus rhythm, the method comprising:</p>	<p>The preambles are not limiting; to the extent a construction is required, plain and ordinary meaning applies.</p> <p>Intrinsic Evidence:</p> <p>'921 Patent, Abstract; Sheets 1-5, 16 (Figures 1-4, 11); 1:1-4:57; 6:33-13:15; Claims 1-15.</p> <p>'921 Patent certified file history, PLTF00003081-3436, at:</p> <ul style="list-style-type: none"> 3212-3220 (January 6, 2017 Non-Final Office Action): "Since the body of the fully and intrinsically sets forth all of the limitations of the claimed invention, the preamble has not been considered a limitation and is given no significant weight in the claim." (3218-3219). 	<p>The preambles are limiting and require "detection of, and discrimination between, NSR (normal sinus rhythm), AF (atrial fibrillation), PVC (premature ventricular contractions), and PAC (premature atrial contractions)."</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000238-64 ('921 Patent), Abstract, 1:56-61, 2:36-56, 2:57-59, 2:63-3:24, 3:26-29, 4:12-5:23, 7:26-30, 8:20-27, Claims 1-9, Fig. 3.</p> <p>'921 patent file history, Non-Final Office Action dated January 6, 2017 (PLTF00003212-3220), at 1-7.</p> <p>'921 patent file history, Amendment and</p>

'921 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
<p>Claim 3: A computer implemented method for discriminating between normal sinus rhythm (NSR) with premature ventricular contractions (PVC) or normal sinus rhythm (NSR) with premature atrial contractions (PACs) and normal sinus rhythm without PVC or PAC and atrial fibrillation, the method comprising:</p> <p>Claim 4: A system for discriminating between normal sinus rhythm without premature ventricular contractions or premature atrial contractions and atrial fibrillation and premature ventricular contractions (PVC) and premature atrial contractions (PACs), the system comprising:</p> <p>Claim 5: A system for discriminating between atrial fibrillation and premature ventricular contractions (PVC) and premature atria contractions (PACs) and normal sinus rhythm, the system comprising:</p> <p>Claim 6: A system for discriminating between</p>	<ul style="list-style-type: none"> • 3231-3266 (Amendment and Response to Office Action) • 3268-3277 (April 14, 2017 Final Office Action) "Since the body of the fully and intrinsically sets forth all of the limitations of the claimed invention, the preamble has not been considered a limitation and is given no significant weight in the claim." (3276). • 3280-3281 (June 12, 2017 Interview Summary) • 3284-3308 (Amendments and Remarks) • 3309-3333 (Amendment and Response to Final Office Action) • 3342-3345 (July 20, 2017 Advisory Action) • 3360-3366 (Notice of Allowance) • 3382-3394 (Amendment) • 3430-3434 (Amendment) 	<p>Response to Office Action dated April 5, 2017 (PLTF00003231-3266), at 3-11, 13-17.</p> <p>'921 patent file history, Final Office Action dated April 14, 2017 (PLTF00003268-3277), at 1-8.</p> <p>'921 patent file history, Amendment and Response to Final Office Action dated June 12, 2017 (PLTF00003309-3334), at 2-14, 17-24.</p> <p>'921 patent file history, Notice of Allowance dated January 18, 2018 (PLTF00003360-3366).</p> <p>'921 patent file history, Corrected Notice of Allowance dated February 9, 2018 (PLTF00003376-3380).</p>

'921 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
normal sinus rhythm (NSR) with premature ventricular contractions (PVC) or normal sinus rhythm (NSR) with premature atrial contractions (PACs) and normal sinus rhythm without PVC or PAC and atrial fibrillation, the system comprising:		
<p>Preambles: Claims 7-9</p> <p>A non-transitory computer usable medium having computer readable code embodied therein, the computer readable code, when executed in one or more processors, causing the one or more processors to:</p>	<p>The preambles are not limiting; to the extent a construction is required, plain and ordinary meaning applies.</p> <p>Intrinsic Evidence:</p> <p>'921 Patent, Sheet 1, 16 (Figure 1, 11); 3:25-4:2; 6:57-7:3; 12:25-13:15; Claims 1-15.</p> <p>'921 Patent certified file history, PLTF00003081-3436, at:</p> <ul style="list-style-type: none"> 3212-3220 (January 6, 2017 Non-Final Office Action): "Since the body of the fully and intrinsically sets forth all of the limitations of the claimed invention, the preamble has not been considered a limitation and is given no significant weight in the claim." (3218-3219). 3231-3266 (Amendment and Response to Office Action) 3268-3277 (April 14, 2017 Final Office Action) "Since the body of the 	<p>The preambles are limiting and require "detection of, and discrimination between, NSR (normal sinus rhythm), AF (atrial fibrillation), PVC (premature ventricular contractions), and PAC (premature atrial contractions)."</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000238-64 ('921 Patent), Abstract, 1:56-61, 2:36-56, 2:57-59, 2:63-3:24, 3:26-29, 4:12-5:23, 7:26-30, 8:20-27, Claims 1-9, Fig. 3.</p> <p>'921 patent file history, Non-Final Office Action dated January 6, 2017 (PLTF00003212-3220), at 1-7.</p> <p>'921 patent file history, Amendment and Response to Office Action dated April 5, 2017 (PLTF00003231-3266), at 3-11, 13-17.</p> <p>'921 patent file history, Final Office Action dated April 14, 2017</p>

'921 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p>fully and intrinsically sets forth all of the limitations of the claimed invention, the preamble has not been considered a limitation and is given no significant weight in the claim.” (3276).</p> <ul style="list-style-type: none"> • 3280-3281 (June 12, 2017 Interview Summary) • 3284-3308 (Amendments and Remarks) • 3309-3333 (Amendment and Response to Final Office Action) • 3342-3345 (July 20, 2017 Advisory Action) • 3360-3366 (Notice of Allowance) • 3382-3394 (Amendment) • 3430-3434 (Amendment) <p>Extrinsic Evidence:</p> <p>'362 Patent, 5:30-35.</p> <p>Merriam Webster, https://www.merriam-webster.com/dictionary/transitory (last visited Apr. 6, 2024).</p>	<p>(PLTF00003268-3277), at 1-8.</p> <p>'921 patent file history, Amendment and Response to Final Office Action dated June 12, 2017 (PLTF00003309-3334), at 2-14, 17-24.</p> <p>'921 patent file history, Notice of Allowance dated January 18, 2018 (PLTF00003360-3366).</p> <p>'921 patent file history, Corrected Notice of Allowance dated February 9, 2018 (PLTF00003376-3380).</p>
<p>“turning point ratio”</p> <p>(Claims 1-9)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'921 Patent, Abstract; Sheets 8-9, 11 (Figures</p>	<p>“a ratio of the number of intervals surrounded by either two higher (i.e., longer) or two lower (i.e., shorter) intervals to the total number of</p>

'921 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p>7, 9); 2:61-3:24; 5:35-6:31; 7:45-10:54; 11:39-12:2; Claims 1-15.</p> <p>'921 Patent certified file history, PLTF00003081-3436, at:</p> <ul style="list-style-type: none"> • 3212-3220 (January 6, 2017 Non-Final Office Action): "Since the body of the fully and intrinsically sets forth all of the limitations of the claimed invention, the preamble has not been considered a limitation and is given no significant weight in the claim." (3218-3219). • 3231-3266 (Amendment and Response to Office Action) • 3268-3277 (April 14, 2017 Final Office Action) "Since the body of the fully and intrinsically sets forth all of the limitations of the claimed invention, the preamble has not been considered a limitation and is given no significant weight in the claim." (3276). • 3280-3281 (June 12, 2017 Interview Summary) • 3284-3308 (Amendments and Remarks) • 3309-3333 (Amendment and Response to Final Office Action) • 3342-3345 (July 20, 2017 Advisory Action) 	<p>intervals"</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000238-64 ('921 patent), 3:3-10, 5:37-6:2, 8:13-19, Claims 1-9.</p> <p><u>Extrinsic Evidence:</u></p> <p>SUNY_00007407 (New Technology Disclosure Case No. R-7973).</p> <p>SUNY_00007411 (New Technology Disclosure Case No. R-7973).</p> <p>SAM-SNY_00025199–207, at SAM-SNY_00025200 (S. Dash, <i>Automatic Real Time Detection of Atrial Fibrillation</i>, 1702.)</p> <p>SAM-SNY_00025199–207, at SAM-SNY_00025200 (S. Dash, <i>Automatic Real Time Detection of Atrial Fibrillation</i>, 1702.)</p> <p>SAM-SNY_00032449–84, at SAM-SNY_00032484 (Lu, <i>Automatic Real Time Detection of Atrial Fibrillation</i>.)</p> <p>SAM-SNY_00029573–76, at SAM-SNY_00029573 (Dash, <i>A Statistical Approach for Accurate Detection of Atrial Fibrillation and Flutter</i>, 137.)</p>

'921 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<ul style="list-style-type: none"> • 3360-3366 (Notice of Allowance) • 3382-3394 (Amendment) • 3430-3434 (Amendment) <p>Extrinsic Evidence:</p> <p>“The presence of randomness is ascertained by categorizing RRS relative to their surrounding RRs. It can be shown that in a vector of random numbers the fraction of numbers which are preceded and followed by both higher or lower numbers (‘Turning Points Ratio (TPR)’ is 2/3.” SUNY_00007404 (New Technology Disclosure Case No. R-7973).</p>	<p>SAM-SNY_00029573–76, at SAM-SNY_00029575 (Dash, <i>A Statistical Approach for Accurate Detection of Atrial Fibrillation and Flutter</i>, 139.)</p> <p>UCONN_00004014-69, at UCONN_00004034; <i>see also</i> UCONN_00004032.</p> <p>PLTF00000103-16 (’326 patent) at 4:16-18.</p> <p>PLTF00000140-70 (’576 patent) at 4:4-16, 5:22-40, 6:30-32, claims 1, 8, and 16.</p> <p>PLTF00000059-80 (’601 patent) at 3:5-12, 5:56-6:10, 8:19-21, claims 1-3.</p> <p>PLTF00014083-92, at PLTF00014088 (Wesselius, Fons et al., <i>Digital biomarkers and algorithms for detection of atrial fibrillation using surface electrocardiograms: A systematic review</i>, COMPUTERS IN BIOLOGY AND MEDICINE (2021)).</p> <p>PLTF00015362-85, at PLTF00015367 (Czabanski, Robert et al., <i>Detection of Atrial Fibrillation Episodes in Long-Term Heart Rhythm Signals Using a Support Vector Machine</i>, NATIONAL</p>

'921 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
		LIBRARY OF MEDICINE (2020)).

U.S. Patent No. 10,278,647

'647 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
<p>“a classification of the movement”</p> <p>(Claims 1, 35, 69, 70, 71, 72, 73, 74, 75)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'647 Patent, Sheets 1-7 (Figures 1-5); 1:20-6:30; 10:22-19:38; 21:41-23:38; 29:63-30:22; 42:20-25; Claims 1-75.</p> <p>'647 Patent certified file history, PLTF00003437-4983, at:</p> <ul style="list-style-type: none"> • 4635-4642 (Written Opinion of the International Searching Authority) • 4666-4676 (April 18, 2018 Non-Final Office Action) 	<p>“a classification of movement of the biomedical sensor relative to a sensing location”</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000001-58 ('647 patent) at 1:33-67, 4:62-5:10, 10:22-32, 10:66-11:28, 17:45-62, 18:46-19:2, Figs. 3A, 3B, 3C, Claims 1, 35, 69, 70, 71, 72, 73, 74, 75.</p>

'647 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<ul style="list-style-type: none"> • 4701-4726 (Amendment and Remarks) • 4732-4740 (October 22, 2018 Final Office Action) • 4756-4778 (Reply after Final Rejection) • 4781-4782 (Notice of Allowance) 	
<p>“based on each of the at least one remaining candidate spectral peak retained having been discarded by the second discarding, reconstructing the current representation is based on the prior reconstructed representation; and based on at least one last candidate spectral peak remaining, the at least one last candidate spectral peak remaining not discarded by the second discarding, reconstructing the current representation is based on a selected candidate spectral peak selected from amongst the at least one last candidate spectral peak remaining having a closest corresponding frequency to the prior reconstructed representation's frequency relative to respective frequencies of each of the at least one last candidate spectral peak remaining.”</p> <p>(Claims 14, 48)</p>	<p>This claim term, clause, or phrase is definite; to the extent a construction is required, plain and ordinary meaning applies.</p> <p>Intrinsic Evidence:</p> <p>'647 Patent, Sheets 1-28 (Figures 1-23); 1:20-6:30; 11:30-37; 12:32-18:54; 20:20-45; 26:3-22; Claims 1-75.</p> <p>'647 Patent certified file history, PLTF00003437-4983, at:</p> <ul style="list-style-type: none"> • 4635-4642 (Written Opinion of the International Searching Authority) • 4666-4676 (April 18, 2018 Non-Final Office Action) • 4701-4726 (Amendment and Remarks) • 4732-4740 (October 22, 2018 Final Office Action) • 4756-4778 (Reply after Final Rejection) • 4781-4782 (Notice of Allowance) 	<p>Indefinite</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000001-58 ('647 patent) at 2:57-3:18, 16:4-17:23, Figs. 3A, 3B, 3C, Claims 1, 10, 13, 14, 35, 44, 47, 48.</p> <p><u>Extrinsic Evidence:</u></p> <p>Expert Declaration Dr. Igor Efimov at ¶¶28-34.</p>

'647 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p>Extrinsic Evidence:</p> <p>Declaration of Alena Talkachova.</p>	
<p>“classifying the classification of the movement by comparing an amount of amplitude modulation in the second TFS computed to an amplitude modulation threshold, wherein the classification indicates whether the movement rises to a level of causing the motion artifacts based on a result of the comparing” / “classify the classification of the movement by comparing an amount of amplitude modulation in the second TFS computed to an amplitude modulation threshold, wherein the classification indicates whether the movement rises to a level causing the motion artifacts based on a result of the comparing”</p> <p>(Claims 19, 53, 72, 75)</p>	<p>This claim term, clause, or phrase is definite; to the extent a construction is required, plain and ordinary meaning applies.</p> <p>Intrinsic Evidence:</p> <p>'647 Patent, Sheets 1-7, 22 (Figure 1-5, 17); 1:20-6:29; 10:22-19:38; 34:30-35:18; 36:64-37:30; Claims 1-75.</p> <p>'647 Patent certified file history, PLTF00003437-4983, at:</p> <ul style="list-style-type: none"> • 4635-4642 (Written Opinion of the International Searching Authority) • 4666-4676 (April 18, 2018 Non-Final Office Action) • 4701-4726 (Amendment and Remarks) • 4732-4740 (October 22, 2018 Final Office Action) • 4756-4778 (Reply after Final Rejection) • 4781-4782 (Notice of Allowance) <p>Extrinsic Evidence:</p>	<p>Indefinite</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000001-58 ('647 patent) at 3:38-50, 12:33-13:26., 15:5-32, Figs. 3A, 3B, 3C, Claims 1, 19-23, 35, 53-58, 72, 75.</p> <p><u>Extrinsic Evidence:</u></p> <p>Expert Declaration Dr. Igor Efimov at ¶¶28-31, 35-38.</p>

'647 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	Declaration of Alena Talkachova.	
<p>“wherein the biomedical sensor is at least one of: a photoplethysmogram (PPG) sensor, piezoelectric sensor, Light Emitting Diode (LED) based sensor, camera sensor, and pulse oximeter sensor”</p> <p>(Claims 28, 62)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'647 Patent, Abstract; Sheets 1-7 (Figures 1-5); 1:20-6:29; 10:22-19:38; Claims 1-75.</p> <p>'647 Patent certified file history, PLTF00003437-4983, at:</p> <ul style="list-style-type: none"> • 4635-4642 (Written Opinion of the International Searching Authority) • 4666-4676 (April 18, 2018 Non-Final Office Action) • 4701-4726 (Amendment and Remarks) • 4732-4740 (October 22, 2018 Final Office Action) • 4756-4778 (Reply after Final Rejection) • 4781-4782 (Notice of Allowance) 	<p>“wherein the biomedical sensor includes one or more of each of the following: a photoplethysmogram (PPG) sensor, piezoelectric sensor, Light Emitting Diode (LED) based sensor, camera sensor, and pulse oximeter sensor”</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000001-58 ('647 patent) at 4:38-42, 12:18-26, Figs. 1, 3A, 3B, 3C, 4, 5, 14C, 23, Claims 1, 28, 35, 62.</p>
<p>“employing the reconstructed representation to detect or predict a heart-related ailment, the heart-related ailment including at least one of a heart rate variability (HRV) condition, atrial fibrillation condition, congestive heart failure condition, and tachycardia condition” / “configured to employ the</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'647 Patent, Sheets 1-2, 6-7 (Figures 1-2, 4-5); 1:20-6:29; 10:22-12:16; 17:45-19:38; Claims 1-75.</p>	<p>“employing the reconstructed representation to detect or predict one or more of each of the following heart-related ailments: a heart rate variability (HRV) condition, atrial fibrillation condition, congestive heart failure condition, and tachycardia condition”</p>

'647 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
reconstructed representation to detect or predict a heart-related ailment, the heart-related ailment including at least one of a heart rate variability (HRV) condition, an atrial fibrillation condition, a congestive heart failure condition, and a tachycardia condition” (Claims 32, 66)	<p>'647 Patent certified file history, PLTF00003437-4983, at:</p> <ul style="list-style-type: none"> • 4635-4642 (Written Opinion of the International Searching Authority) • 4666-4676 (April 18, 2018 Non-Final Office Action) • 4701-4726 (Amendment and Remarks) • 4732-4740 (October 22, 2018 Final Office Action) • 4756-4778 (Reply after Final Rejection) • 4781-4782 (Notice of Allowance) 	<p><u>Intrinsic Evidence:</u></p> <p>PLTF00000001-58 ('647 patent) at, 4:50-55, 10:44-65, 12:8-15, 19:21-39, Figs. 1, 2, 3A, 3B, 3C, 4, 5, 14C, 23, Claims 1, 28, 35, 62.</p>

U.S. Patent No. 10,285,601

'601 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
<p>Claim 1 Preamble: A system for discriminating between normal sinus rhythm without premature ventricular contractions or premature atrial contractions and atrial fibrillation and premature ventricular contractions (PVC) and premature atrial contractions (PACs), the system comprising:</p> <p>Claim 2 Preamble: A system for discriminating between atrial fibrillation and premature ventricular contractions (PVC) and</p>	<p>The preambles are not limiting; to the extent a construction is required, plain and ordinary meaning applies.</p> <p><u>Intrinsic Evidence:</u></p> <p>'601 Patent, Abstract; Sheets 1-10 (Figures 1-9); 1:25-4:7; 4:63-5:38; 6:41-12:43; Claims 1-5.</p> <p>'601 Patent certified file history, PLTF00004984-5130, at:</p>	<p>The preambles are limiting and require “detection of, and discrimination between, NSR (normal sinus rhythm), AF (atrial fibrillation), PVC (premature ventricular contractions), and PAC (premature atrial contractions).”</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000059-80 ('601 Patent), Abstract, 1:60-65, 2:38-58, 2:59-61, 2:65-3:28, 3:31-34, 4:17-5:27, 7:34-38,</p>

'601 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
<p>premature atrial contractions (PACs) and normal sinus rhythm, the system comprising:</p> <p>Claim 3 Preamble: A system for discriminating between normal sinus rhythm (NSR) with premature ventricular contractions (PVC) or normal sinus rhythm (NSR) with premature atrial contractions (PACs) and normal sinus rhythm without PVC or PAC and atrial fibrillation, the system comprising:</p>	<ul style="list-style-type: none"> • 5053-5057 (September 21, 2018 Non-Final Office Action) • 5070-5077 (Amendment and Response) • 5089-5095 (Notice of Allowance) • 5106-5111 (Amendment and Remarks) <p>'921 Patent certified file history, PLTF00003081-3436, at:</p> <ul style="list-style-type: none"> • 3212-3220 (January 6, 2017 Non-Final Office Action): "Since the body of the fully and intrinsically sets forth all of the limitations of the claimed invention, the preamble has not been considered a limitation and is given no significant weight in the claim." (3218-3219). • 3231-3266 (Amendment and Response to Office Action) • 3268-3277 (April 14, 2017 Final Office Action) "Since the body of the fully and intrinsically sets forth all of the limitations of the claimed invention, the preamble has not been considered a limitation and is given no significant weight in the claim." (3276). • 3280-3281 (June 12, 2017 Interview Summary) • 3284-3308 (Amendments and 	<p>8:26-32, Claims 1-3, Fig. 3.</p> <p>'601 patent file history, Non-Final Rejection dated September 21, 2018 (PLTF00005053-5057).</p> <p>'601 patent file history, Amendment and Response dated December 6, 2018 (PLTF00005070-5078).</p> <p>'601 patent file history, Notice of Allowance dated December 28, 2018 (PLTF00005089-5095).</p> <p>'921 patent file history, Non-Final Office Action dated January 6, 2017 (PLTF00003212-3220), at 1-7.</p> <p>'921 patent file history, Amendment and Response to Office Action dated April 5, 2017 (PLTF00003231-3266), at 3-11, 13-17.</p> <p>'921 patent file history, Final Office Action dated April 14, 2017 (PLTF00003268-3277), at 1-8</p> <p>'921 patent file history, Amendment and Response to Final Office Action dated June 12, 2017 (PLTF00003309-3334), at 2-14, 17-24.</p> <p>'921 patent file history, Notice of Allowance dated January 18, 2018 (PLTF00003360-3366).</p>

'601 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p>Remarks)</p> <ul style="list-style-type: none"> • 3309-3333 (Amendment and Response to Final Office Action) • 3342-3345 (July 20, 2017 Advisory Action) • 3360-3366 (Notice of Allowance) • 3382-3394 (Amendment) • 3430-3434 (Amendment) 	<p>'921 patent file history, Corrected Notice of Allowance dated February 9, 2018 (PLTF00003376-3380).</p>
<p>“turning point ratio” (Claims 1-3)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'601 Patent, Abstract; Sheets 2-4, 8-10, 13 (Figures 2, 3, 7, 9, 11); 1:25-4:7; 5:39-6:9; 7:28-8:39; 9:58-13:19; Claims 1-5.</p> <p>'601 Patent certified file history, PLTF00004984-5130, at:</p> <ul style="list-style-type: none"> • 5053-5057 (September 21, 2018 Non-Final Office Action) • 5070-5077 (Amendment and Response) • 5089-5095 (Notice of Allowance) • 5106-5111 (Amendment and Remarks) <p>'921 Patent certified file history, PLTF00003081-3436, at:</p> <ul style="list-style-type: none"> • 3212-3220 (January 6, 2017 Non- 	<p>“a ratio of the number of intervals surrounded by either two higher (i.e., longer) or two lower (i.e., shorter) intervals to the total number of intervals”</p> <p><u>Intrinsic Evidence:</u></p> <p>PLTF00000059-80 ('601 patent), 3:5-12, 5:40-6:10, 8:18-25, Claims 1-3.</p> <p><u>Extrinsic Evidence:</u></p> <p>SUNY_00007407 (New Technology Disclosure Case No. R-7973).</p> <p>SUNY_00007411 (New Technology Disclosure Case No. R-7973).</p> <p>SAM-SNY_00025199–207, at SAM-SNY_00025200 (S. Dash, <i>Automatic</i></p>

'601 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p>Final Office Action): "Since the body of the fully and intrinsically sets forth all of the limitations of the claimed invention, the preamble has not been considered a limitation and is given no significant weight in the claim." (3218-3219).</p> <ul style="list-style-type: none"> • 3231-3266 (Amendment and Response to Office Action) • 3268-3277 (April 14, 2017 Final Office Action) "Since the body of the fully and intrinsically sets forth all of the limitations of the claimed invention, the preamble has not been considered a limitation and is given no significant weight in the claim." (3276). • 3280-3281 (June 12, 2017 Interview Summary) • 3284-3308 (Amendments and Remarks) • 3309-3333 (Amendment and Response to Final Office Action) • 3342-3345 (July 20, 2017 Advisory Action) • 3360-3366 (Notice of Allowance) • 3382-3394 (Amendment) • 3430-3434 (Amendment) <p>Extrinsic Evidence:</p>	<p><i>Real Time Detection of Atrial Fibrillation</i>, 1702.)</p> <p>SAM-SNY_00025199–207, at SAM-SNY_00025200 (S. Dash, <i>Automatic Real Time Detection of Atrial Fibrillation</i>, 1702.)</p> <p>SAM-SNY_00032449–84, at SAM-SNY_00032484 (Lu, <i>Automatic Real Time Detection of Atrial Fibrillation</i>.)</p> <p>SAM-SNY_00029573–76, at SAM-SNY_00029573 (Dash, <i>A Statistical Approach for Accurate Detection of Atrial Fibrillation and Flutter</i>, 137.)</p> <p>SAM-SNY_00029573–76, at SAM-SNY_00029575 (Dash, <i>A Statistical Approach for Accurate Detection of Atrial Fibrillation and Flutter</i>, 139.)</p> <p>UCONN_00004014-69, at UCONN_00004034; <i>see also</i> UCONN_00004032.</p> <p>PLTF00000103-16 ('326 patent), 4:16-18.</p>

'601 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p>"The presence of randomness is ascertained by categorizing RRS relative to their surrounding RRs. It can be shown that in a vector of random numbers the fraction of numbers which are preceded and followed by both higher or lower numbers ('Turning Points Ratio (TPR)' is 2/3." SUNY_00007404 (New Technology Disclosure Case No. R-7973).</p>	<p>PLTF00000140-70 ('576 patent), 4:4-16, 5:22-40, 6:30-32, claims 1, 8, and 16.</p> <p>PLTF00000238-64 ('921 patent), 3:3-10, 5:51-6:2, 8:14-16, claims 1-9.</p> <p>PLTF00014083-92, e.g., at PLTF00014088 (Wesselius, Fons et al., <i>Digital biomarkers and algorithms for detection of atrial fibrillation using surface electrocardiograms: A systematic review</i>, COMPUTERS IN BIOLOGY AND MEDICINE (2021)).</p> <p>PLTF00015362-85, e.g., at PLTF00015367 (Czabanski, Robert et al., <i>Detection of Atrial Fibrillation Episodes in Long-Term Heart Rhythm Signals Using a Support Vector Machine</i>, NATIONAL LIBRARY OF MEDICINE (2020)).</p>

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'362 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
<p>"noise quality index"</p> <p>(Claims 1, 3, 8, 10, 12, 17, 19)</p>	<p>"parameter that measures the noise content in a signal"</p> <p>Intrinsic Evidence:</p>	<p>"a parameter that increases in value as noise of a signal increases"</p>

'362 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p>'362 Patent, Sheets 4-9 (Figures 2-7); 1:26-5:40; 7:62-13:41; Claims 1-20.</p> <p>'362 Patent certified file history, PLTF00005131-5654, at:</p> <ul style="list-style-type: none"> • 5257-5273 (September 14, 2018 Non-Final Office Action) • 5387-5405 (Remarks) • 5418-5427 (Amendments) • 5439-5472 (Interview Summary, Amendments and Remarks) • 5474-5475 (Notice of Allowance) • 5481-5494 (Examiner's Amendment) • 5599-5606 (Notice of Allowance) <p>Extrinsic Evidence:</p> <p>"The signal quality is usually described by the signal-to-noise ratio (SNR). However, calculating SNR is difficult when it comes to physiological signals because it is impossible to distinguish the signal from noise." PLTF00015605-15608, at 15622 (<i>Devices based on photoplethysmogram and pulse oximetry</i>).</p> <p>"The <i>quality</i> of a signal is often expressed quantitatively as the signal-to-noise <i>ratio</i> (S/N ratio), which is the ratio of the true underlying signal amplitude (e.g. the average amplitude</p>	<p><u>Intrinsic Evidence:</u></p> <p>'362 patent (PLTF00000081-102), 3:24-32, 4:26-43, 5:6-26, 8:12-23, 8:40-51, 8:52-59, 9:5-35, 10:30-56, 11:11-21, 12:30-60, 12:61-13:13.</p> <p>'362 patent (PLTF00000081-102), Claims 1, 3, 8, 10, 12, 17, 19.</p>

'362 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	or the peak height) to the standard deviation of the noise.” PLTF00015781-15796, at 15783 (<i>Intro. To Signal Processing: Signals and Noise</i>).	
<p>“a difference in frequency between the first trace and the second and third trace[,] the difference in frequency referred to as a projected difference”</p> <p>(Claims 1, 10, 19)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'362 Patent, Sheets 1-9 (Figures 1-7); 1:26-5:40; 7:43-13:41; Claims 1-20.</p> <p>'362 Patent certified file history, PLTF00005131-5654, at:</p> <ul style="list-style-type: none"> • 5257-5273 (September 14, 2018 Non-Final Office Action) • 5387-5405 (Remarks) • 5418-5427 (Amendments) • 5439-5472 (Interview Summary, Amendments and Remarks) • 5474-5475 (Notice of Allowance) • 5481-5494 (Examiner's Amendment) • 5599-5606 (Notice of Allowance) <p>Extrinsic Evidence:</p> <p>Declaration of Dr. Alena Talkachova.</p>	<p>“the difference in frequency between the fundamental HR trace and its harmonic traces computed as a sum of (1) the difference in frequency between the second trace and two times the first trace and (2) the difference in frequency between the third trace and three times the first trace”</p> <p><u>Intrinsic Evidence:</u></p> <p>'362 patent (PLTF00000081-102), 4:62-65, 8:12-23.</p> <p>'362 patent (PLTF00000081-102), Claims 1, 10, 19.</p> <p><u>Extrinsic Evidence:</u></p> <p>Expert Declaration Dr. Igor Efimov at ¶¶39-48.</p>
<p>“statistical learning method”</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p>	<p>“an algorithm that continuously adapts its structure as additional data is processed”</p>

'362 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
(Claims 1, 2, 4, 8, 9, 10, 11, 13, 17, 18, 19, 20)	<p>'362 Patent, 1:26-5:40; Claims 1-20.</p> <p>'362 Patent certified file history, PLTF00005131-5654, at:</p> <ul style="list-style-type: none"> • 5257-5273 (September 14, 2018 Non-Final Office Action) • 5387-5405 (Remarks) • 5418-5427 (Amendments) • 5439-5472 (Interview Summary, Amendments and Remarks) • 5474-5475 (Notice of Allowance) • 5481-5494 (Examiner's Amendment) • 5599-5606 (Notice of Allowance) <p>Extrinsic Evidence:</p> <p>"Statistical learning refers to a set of tools for modeling and understanding complex datasets. It is a recently developed area in statistics and blends with parallel developments in computer science and, in particular, machine learning. The field encompasses many methods such as the lasso and sparse regression, classification and regression trees, and boosting and support vector machines." SAM-SNY_00081786-2226, at 81793-94, 81815-81858, 82137-72 (James et al., <i>An introduction to statistical learning</i>).</p>	<p><u>Intrinsic Evidence:</u></p> <p>'362 patent (PLTF00000081-102), 2:19-53, 3:21-32, 4:26-43, 5:13-17, 5:18-26, 9:36-10:27, 10:30-56.</p> <p>'362 patent (PLTF00000081-102), Claims 1, 2, 4, 8, 9, 10, 11, 13, 17, 18, 19, 20.</p> <p>Burges, <i>A Tutorial on Support Vector Machines for Pattern Recognition</i>, Data Mining and Knowledge Discovery (June 1998), 2:121-67.</p> <p><u>Extrinsic Evidence:</u></p> <p>SAM-SNY_00081786-2226, e.g., at SAM-SNY_00081793-94, SAM-SNY_00081815-81858, SAM-SNY_00082137-72 (James et al., <i>An Introduction to Statistical Learning</i>, Springer Texts in Statistics (2013), Preface, 15-58, 337-72.)</p> <p>SAM-SNY_00081747-85, e.g., at SAM-SNY_00081747 (Bousquet et al., <i>Introduction to Statistical Learning</i></p>

'362 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p>“The main goal of statistical learning theory is to provide a framework for studying the problem of inference, that is of gaining knowledge, making predictions, making decisions or constructing models from a set of data. This is studied in a statistical framework, that is there are assumptions of statistical nature about the underlying phenomena (in the way the data is generated).” SAM-SNY_00081747-85, at 81747 (Bousquet et al., <i>Introduction to Statistical Learning Theory</i>).</p> <p>SAM-SNY_00081415-746, at 81419-24, SAM-SNY_00081570-722 (Vapnik, <i>The nature of Statistical Learning Theory</i> (explaining different statistical learning methods and the theory behind them).</p>	<p><i>Theory</i>, Machine Learning 2003 (2004) LNAI 3176, 175.)</p> <p>See SAM-SNY_00081415-746, e.g., at SAM-SNY_00081419-24, SAM-SNY_00081570-722 (Vapnik, <i>The Nature of Statistical Learning Theory</i>, Statistics for Engineering and Information Science (1998), Prefaces, 138-290) (explaining different statistical learning methods and the theory behind them).</p>
<p>“Support Vector Machine (SVM)”</p> <p>(Claims 2, 4, 9, 11, 13, 18, 20)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'362 Patent, Sheets 6-7 (Figures 4-5); 1:26-5:40; 9:36-11:48; Claims 1-20.</p> <p>Christopher J.C. Burges, <i>A Tutorial on Support Vector Machines for Pattern Recognition</i>, which is incorporated by reference in the '362 Patent in its entirety and</p>	<p>“a process that takes a priori determined classification parameter values of clean and corrupted PPG segments as a training data set, finds support vectors among the training data set which maximize the margin (or the distance) between different classes, and then builds a decision boundary”</p> <p><u>Intrinsic Evidence:</u></p>

'362 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p>for all purposes. '362 Patent, 9:42-45.</p> <p>'362 Patent certified file history, PLTF00005131-5654, at:</p> <ul style="list-style-type: none"> • 5257-5273 (September 14, 2018 Non-Final Office Action) • 5387-5405 (Remarks) • 5418-5427 (Amendments) • 5439-5472 (Interview Summary, Amendments and Remarks) • 5474-5475 (Notice of Allowance) • 5481-5494 (Examiner's Amendment) • 5599-5606 (Notice of Allowance) <p>Extrinsic Evidence:</p> <p>"Support vector machines (SVMs) are a set of supervised learning methods used for classification, regression and outliers detection." PLTF00014111-14120, at 14111 (Hossain, Md-Billal et al. <i>Support Vector Machines</i>).</p>	<p>'362 patent (PLTF00000081-102), 2:19-53, 3:21-22, 5:13-17, 9:36-10:27, 10:30-56.</p> <p>'362 patent (PLTF00000081-102), Claims 2, 4, 9, 11, 13, 18, 20.</p> <p>Burges, <i>A Tutorial on Support Vector Machines for Pattern Recognition</i>, Data Mining and Knowledge Discovery (June 1998), 2:121-67.</p> <p><u>Extrinsic Evidence:</u></p> <p>SAM-SNY_00081308-20, e.g., at SAM-SNY_00081308 (Chong et al., <i>Photoplethysmograph Signal Reconstruction Based on a Novel Hybrid Motion Artifact Detection–Reduction Approach. Part I: Motion and Noise Artifact Detection</i>," <i>Annals of Biomedical Eng.</i> (Nov. 2014) 42(11), 2238.)</p> <p>SAM-SNY_00037718-29, e.g., at SAM-SNY_00037721, SAM-SNY_00037722 (Yu et al., <i>A Method for Automatic Identification of Reliable Heart Rates</i></p>

'362 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
		<p><i>Calculated From ECG and PPG Waveforms</i>, Journal of the American Medical Informatics Association (May 2006), 13:3, 312.)</p> <p>SAM-SNY_00081415-746, e.g., at SAM-SNY_00081419-24, SAM-SNY_00081570-656, SAM-SNY_00081699-722 (Vapnik, <i>The Nature of Statistical Learning Theory</i>, Statistics for Engineering and Information Science (1998), Prefaces, 138-224, 267-290.)</p>
<p>“a difference between the dominant frequency and a heart rate obtained from peak to peak intervals from the signal used as the PPG signal in a time domain, the difference between the dominant frequency and the heart rate obtained from peak to peak intervals referred to as a heart rate frequency difference”</p> <p>(Claims 3, 8, 12, 17)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'362 Patent, Sheets 1-3 (Figures 1A-1D); 1:26-5:40; 7:43-8:59; Claims 1-20.</p> <p>'362 Patent certified file history, PLTF00005131-5654, at:</p> <ul style="list-style-type: none"> • 5257-5273 (September 14, 2018 Non-Final Office Action) • 5387-5405 (Remarks) • 5418-5427 (Amendments) • 5439-5472 (Interview Summary, Amendments and Remarks) • 5474-5475 (Notice of Allowance) • 5481-5494 (Examiner's Amendment) • 5599-5606 (Notice of Allowance) 	<p>“a difference between the dominant frequency and the frequency of the heart rate obtained from peak to peak intervals from the signal used as the PPG signal in a time domain”</p> <p><u>Intrinsic Evidence:</u></p> <p>'362 patent (PLTF00000081-102), 4:66-5:5, 8:24-39.</p> <p>'362 patent (PLTF00000081-102), Claims 3, 8, 12, 17.</p>

'362 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
<p>“variable frequency complex demodulation”</p> <p>(Claims 7, 16)</p>	<p>Plain and ordinary meaning.</p> <p>Intrinsic Evidence:</p> <p>'362 Patent, Sheets 5-8 (Figures 3, 4, 6); 1:26-5:40; 5:41-7:61; 8:60-13:31; Claims 1-20.</p> <p>“[T]he variable frequency complex demodulation (VFCDM) is used to obtain even more accurate TFS [time-frequency spectra] and amplitudes of the TFS. ... In the case of the variable frequency method, the first step is to use any of the time-frequency approaches [e.g., TVOPS [time-varying optimal parameter search], FFCDM [fixed-frequency complex demodulation], or smoothed pseudo Wigner-Ville ((SPWV)]... to obtain an estimate of the TFS.” UCONN_00004797-4809, at 4798-99 (Wang et al., <i>A High Resolution Approach to Estimating Time-Frequency Spectra and Their Amplitudes</i>, ANNALS OF BIOMEDICAL ENGINEERING, Vol. 34, No. 2, pp. 326-338 (February 2006)), incorporated by reference in its entirety, '362 Patent, 6:30-36.</p> <p>'362 Patent certified file history, PLTF00005131-5654, at:</p> <ul style="list-style-type: none"> • 5257-5273 (September 14, 2018 Non-Final Office Action) • 5387-5405 (Remarks) 	<p>“a method for estimating a time-frequency spectrum (TFS) of a time-varying signal comprising two phases: (1) constructing an initial TFS (iTFS) using fixed frequency complex modulation; and (2) using the centered frequencies of the iTFS to obtain even more accurate TFS.”</p> <p><u>Intrinsic Evidence:</u></p> <p>'362 patent (PLTF00000081-102), 2:19-53, 6:29-44, 6:45-7:42, 7:43-61, 8:61-9:35, 11:22-48, 11:60-12:28, 12:30-60, 12:61-13:13.</p> <p>SAM-SNY_00027284-307 (U.S. Patent Application Publication No. 2012/0190947), ¶¶ [0058]-[0065].</p> <p>SAM-SNY_00032372-84 (Wang et al., <i>A High Resolution Approach to Estimating Time-Frequency Spectra and Their Amplitudes</i>, Ann Biomed Eng. (February 2006) 34(2):326 38.)</p> <p>'362 patent (PLTF00000081-102),</p>

'362 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<ul style="list-style-type: none"> • 5418-5427 (Amendments) • 5439-5472 (Interview Summary, Amendments and Remarks) • 5474-5475 (Notice of Allowance) • 5481-5494 (Examiner's Amendment) • 5599-5606 (Notice of Allowance) <p>Extrinsic Evidence:</p> <p>“VFCDM is a high-resolution time-frequency analysis technique...that has been used for a variety of physiological signal processing...” PLTF00015271-15295, at 15276 (Hossain, Md-Billal et al., <i>A robust ECG denoising technique using variable frequency complex demodulation</i>).</p> <p>“VFCDM is a high-resolution time-frequency analysis technique...that has been used for a variety of physiological signal processing. While providing a high-resolution time-frequency spectrum (TFS) of a given signal, VFCDM also retains accurate amplitude distribution of the signal.” PLTF00015475-15478, at 15476 (Hossain, Md-Billal et al. <i>Denoising Wearable Armband ECG Data Using the Variable Frequency Complex Demodulation Technique</i>).</p> <p>“[T]he variable frequency complex demodulation (VFCDM) is used to obtain even</p>	<p>Claims 7, 16.</p> <p>'362 patent file history, at Applicant's Remarks December 11, 2018 (PLTF00005383-406), at 20-22.</p> <p><u>Extrinsic Evidence:</u></p> <p>SAM-SNY_00027377-86, e.g., at SAM-SNY_00027378 (Chon et al., <i>Estimation of Respiratory Rate From Photoplethysmogram Data Using Time-Frequency Spectral Estimation</i>, IEEE Transactions on Biomedical Engineering (August 2009), 56:8, 2055.)</p> <p>SAM-SNY_00081294-307, e.g., at SAM-SNY_00081296 (Nam et. al., <i>Respiratory Rate Estimation from the Built-in Cameras of Smartphones and Tablets</i>, Annals of Biomedical Eng. (Nov. 2013), 42(4), 887.)</p>

'362 Claim Term, Clause, or Phrase	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
	<p>more accurate TFS [time-frequency spectra] and amplitudes of the TFS. ... In the case of the variable frequency method, the first step is to use any of the time-frequency approaches [e.g., TVOPS [time-varying optimal parameter search], FFCDM [fixed-frequency complex demodulation], or smoothed pseudo Wigner-Ville ((SPWV)]... to obtain an estimate of the TFS." UCONN_00004797-4809, at 4798-99 (Wang et al., <i>A High Resolution Approach to Estimating Time-Frequency Spectra and Their Amplitudes</i>, ANNALS OF BIOMEDICAL ENGINEERING, Vol. 34, No. 2, pp. 326-338 (February 2006)), incorporated by reference in its entirety, '362 Patent, 6:30-36.</p>	